# 3V dual pre/power amplifier

## BA3516

The BA3516 is a dual pre / power amplifier designed for headphone stereo applications. It operates off a 3V supply. The preamplifier block can be direct-coupled, and the power amplifiers do not require bootstrap capacitors, and use a fixed-gain negative feedback circuit to reduce the number of external components required and allow compact and reliable set designs.

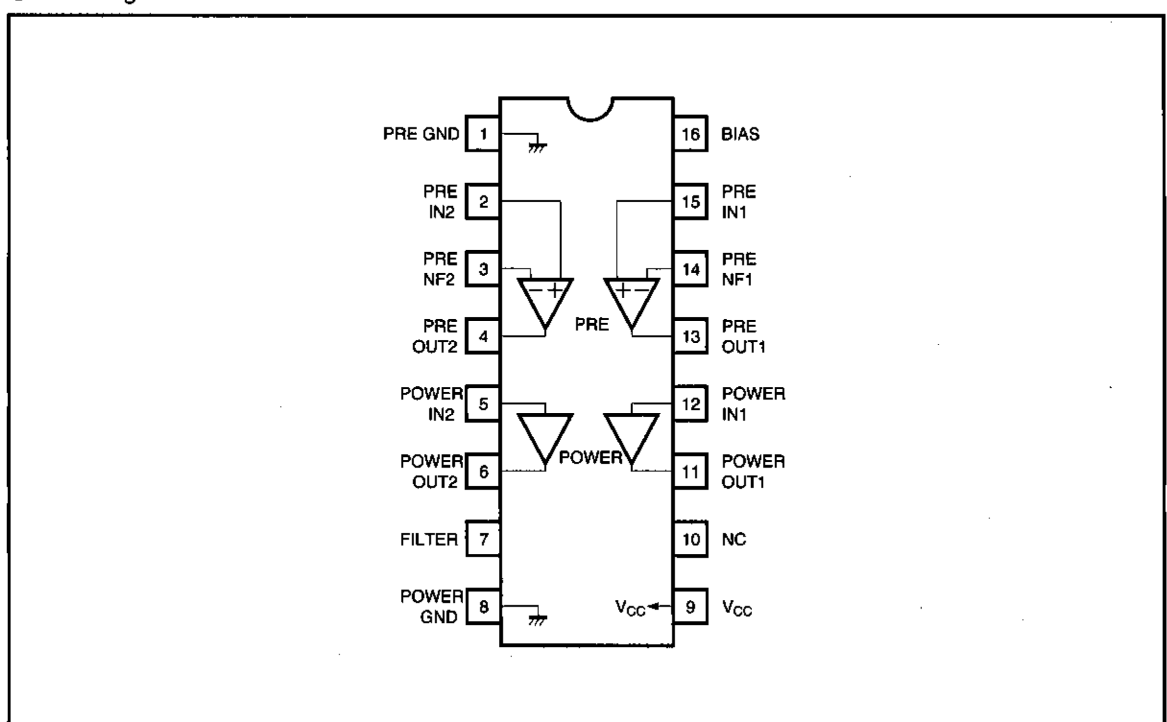
● Applications

3V headphone stereos and 3V radio cassette players.

● Features

1) Dual preamplifiers and power amplifiers on one chip.
2) Preamplifiers can be direct coupled.
3) Bootstrap capacitors for the power amplifiers are not required.
4) The preamplifiers have high gain (78dB), low noise (1 $\mu$Vrms), and low distortion (0.03%).
5) The power amplifiers have high output (40mW × 2), low noise (80 $\mu$Vrms), and low distortion (0.5%).

● Block diagram








●Absolute maximum ratings (Ta = 25℃)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | 4.5 | V |
| Power dissipation | Pd | 1000*1 | mW |
| Operating temperature | Topr | −25~75 | ℃ |
| Storage temperature | Tstg | −55~125 | ℃ |

*1 Reduced by 10.0mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25℃)

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | 1.8 | 2.4 | 3.6 | V |

●Electrical characteristics (unless otherwise specified Ta = 25℃, $V_{CC}$ = 2.4V and f= 1kHz)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions | Measurement Circuit |
|---|---|---|---|---|---|---|---|
| Quiescent circuit current | $I_Q$ | − | 8 | 14 | mA | $V_{IN}$=0$V_{rms}$ | Fig.1 |
| <Preamplifier>$R_L$=10kΩ | | | | | | | |
| Open-circuit voltage gain | $G_{VO}$ | 72 | 78 | − | dB | $V_O$=−10dBm | Fig.1 |
| Maximum output voltage | $V_{OM}$ | 200 | 300 | − | $mV_{rms}$ | THD=1% | Fig.1 |
| Total harmonic distortion | $THD_1$ | − | 0.03 | 0.15 | % | $V_O$=0.2$V_{rms}$, NAB33dB | Fig.1 |
| Input conversion-noise voltage | $V_{NIN}$ | − | 1.0 | 1.8 | μVrms | Rg=2.2kΩ, BPF20~20kHz | Fig.1 |
| Ripple rejection | $RR_1$ | 40 | 47 | − | dB | $V_{RR}$=−20dBm, f=100Hz NAB33dB, Rg=2.2kΩ | Fig.1 |
| Input bias current | $I_{B1}$ | − | 60 | 300 | nA | $V_{IN}$=0$V_{rms}$ | Fig.1 |
| <Power amplifier>$R_L$=16Ω | | | | | | | |
| Rated output | $P_{OUT}$ | 30 | 40 | − | mW | THD=10% | Fig.1 |
| Closed-circuit voltage gain | $G_{VC}$ | 34 | 36 | 38 | dB | $V_{IN}$=−40dBm | Fig.1 |
| Total harmonic distortion | $THD_2$ | − | 0.5 | 1.5 | % | $P_O$=1mW | Fig.1 |
| Output noise voltage | $V_{NO}$ | − | 80 | 125 | μVrms | Rg=0Ω, BPF20~20kHz | Fig.1 |
| Ripple rejection | $RR_2$ | 35 | 48 | − | dB | $V_{RR}$=−20dBm, f=100Hz, Rg=0Ω | Fig.1 |
| Input resistance | $R_{IN}$ | 21.4 | 30 | 38.6 | kΩ | − | Fig.1 |
| Input bias current | $I_{B2}$ | − | 22 | 80 | nA | $V_{IN}$=0$V_{rms}$, Rg=10kΩ *1 | Fig.1 |
| Channel balance | CB | − | 0 | 0.7 | dB | $V_O$=−10dBm | Fig.1 |
| <Preamplifier + power amplifier<connection as per application example circuit>> | | | | | | | |
| Channel separation | $CS_{L-R}$ | 27 | 37 | − | dB | Pre-Rg=2.2kΩ, VR Max.*2 Single channel Power-Vo=-5dBm BPF20~20kHz | Fig.1 |
| Leakage from preamp to power amp for signal leak VR Min. | SL | − | −63 | −57 | dBm | Power-Rg=0Ω*3 When both channels are operating Pre $V_{OUT}$=-12dBm | Fig.1 |

*1 $I_{B2} = \frac{V_{B2}}{10k\Omega} \times \frac{4}{3}$

VB2: Voltage at each end of Rg=10kΩ.

*2 0dB attenuation from the preamplifier output to power amplifier input.

*3 Power amplifier signal source impedance is 0Ω

●Measurement circuit

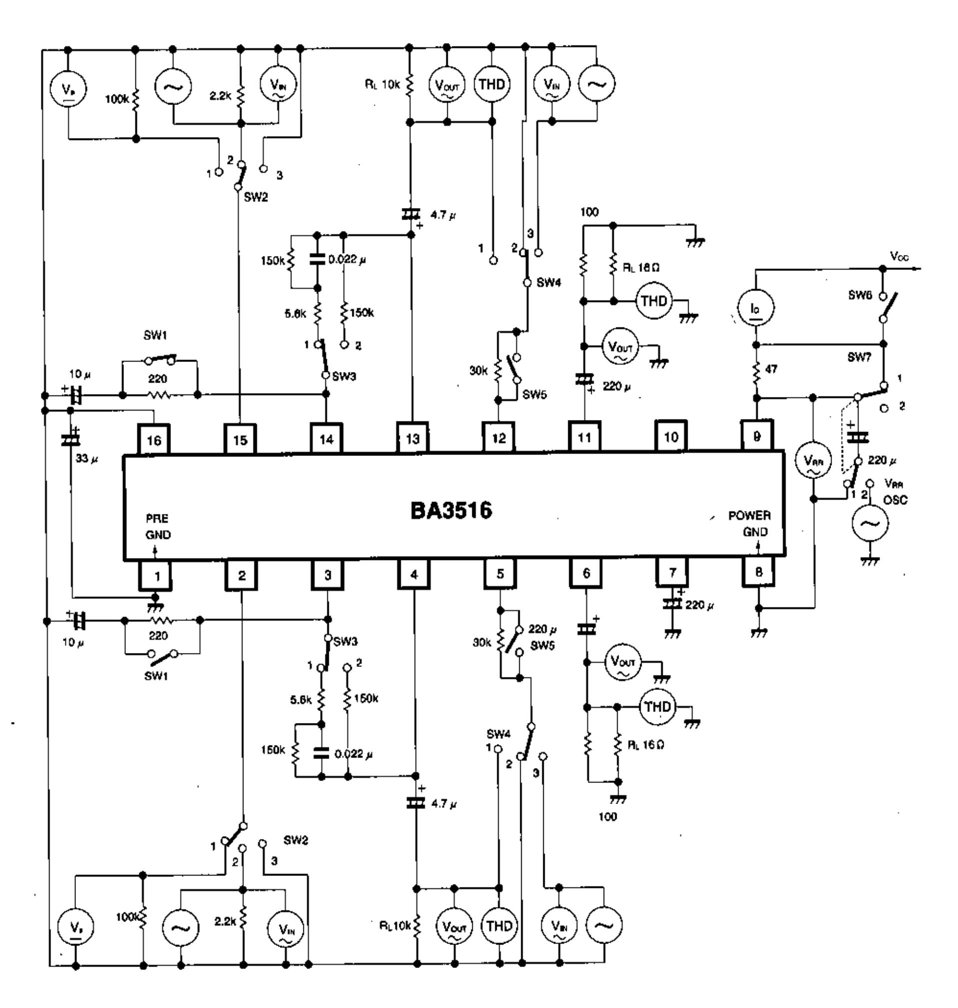



Fig. 1

● Application example

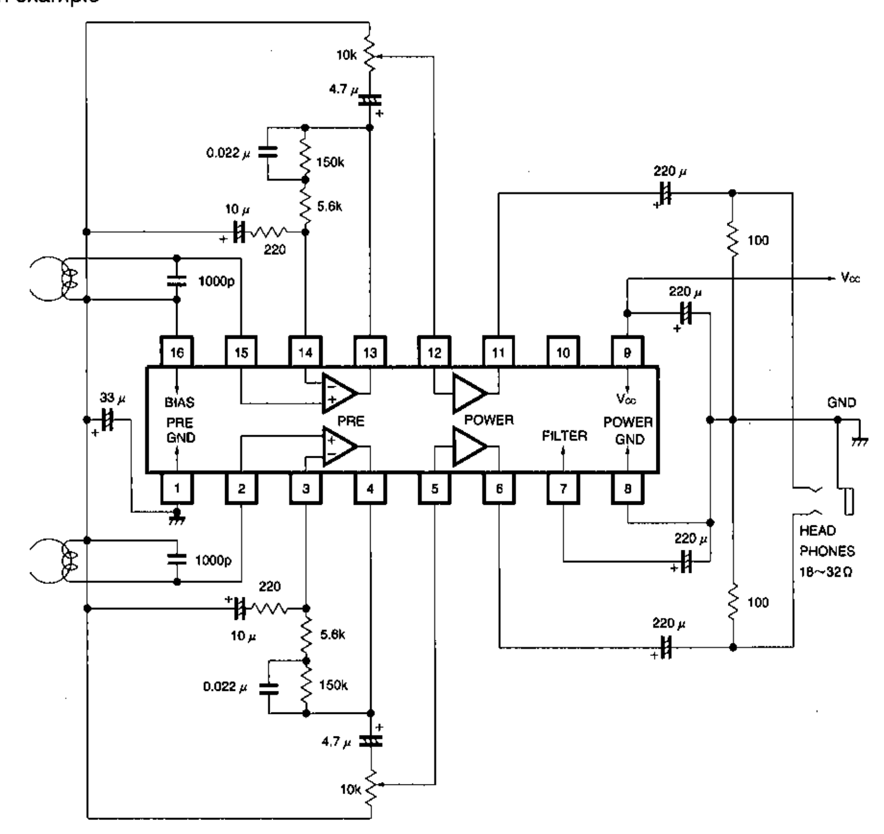



Fig. 2

● External dimensions (Unit: mm)

